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Teaching about chemical resistant gloves with educational exhibits

Linda Manikowske

North Dakota State University--Fargo

Janis Stone

Iowa State University

Brecca Farr

University of Alabama, Birmingham

James Wilson

South Dakota State University

Wendy Wintersteen

Iowa State University, wwinters@iastate.edu

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Abstract

Educational exhibits are often used for teaching at farm and home shows or other expositions. This study determined factors that promoted learning from an educational exhibit on chemical resistant gloves for handling pesticides. An "active" exhibit where participants tried on gloves was compared to a "static" version without this activity. "Talking to staff" at the exhibit was most important in attracting attention and helping to learn about glove safely followed by "getting hands measured" and "trying on gloves." eighty percent indicated that they had read fact sheets provided at the exhibit and 32.5% shared fact sheets with others. Sixty-nine percent in the active group liked learning through exhibits.

Disciplines

Agricultural Education | Educational Assessment, Evaluation, and Research | Entomology | Interactive Arts

Comments

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Teaching About Chemical Resistant Gloves With Educational Exhibits

ABSTRACT

Educational exhibits are often used for teaching at farm and home shows or other expositions. This study determined factors that promoted learning from an educational exhibit on chemical resistant gloves for handling pesticides. An "active" exhibit where participants tried on gloves was compared to a "static" version without this activity. "Talking to staff" at the exhibit was most important in attracting attention and helping to learn about glove safety followed by "getting hands measured" and "trying on gloves." Eighty percent indicated that they had read fact sheets provided at the exhibit and 32.5% shared fact sheets with others. Sixty-nine percent in the active group liked learning through exhibits.

INTRODUCTION

Chemically resistant gloves can help prevent exposure to pesticides for farmers and homeowners who apply these chemicals annually. Training programs such as the USDA Pesticide Applicator Training program seldom have adequate time to explain glove alternatives, their varied chemical resistance, and fit.

Opportunities exist for reaching pesticide applicators through exhibits at farm and home shows or other expositions. To identify factors that contribute to the success of educational exhibits, this study was developed and carried out in both Iowa and South Dakota. Its purpose was to determine factors in an educational exhibit that promote learning.

Two versions of a table-top exhibit were designed to provide

an educational experience so that people could learn more about chemically resistant gloves for pesticide application. One version of the exhibit was static, with only visual stimuli; the second provided an active learning opportunity, in which people tried on gloves and used them to do a task. This article compares the results of using these two versions of the exhibit with participants at separate but similar events for farm audiences held in two states.

REVIEW OF LITERATURE

The research-based literature concerning effective educational displays for adult learners is limited. The adult learner's framework for applying the information, as well as the outcomes for learning, differs (Apps,

1991; Heimlich & Norland, 1994). An adult learner draws upon his or her life experience as a part of the learning process. Making connections between the information being "taught" and past experiences is a unique characteristic of adult learners (Apps, 1991; Heimlich & Norland, 1994).

A limited amount of research has examined which features of a small exhibit or display affect an adult's learning experience. Theory-based literature such as Deemer (1994) deals mostly with larger exhibits such as those at museums or commercial trade shows, rather than smaller exhibits or displays that might be used in educational settings. Other information found on designing displays concern primarily traditional elementary or secondary classroom use (Firlik, 1980) or discuss elements of design to be incorporated into a general display or exhibit (Jackson, 1993).

The study that most closely examined the relationship between features of a small exhibit or display and the effect on adult learning was conducted

ant Gloves

Linda Manikowske, PhD
North Dakota State University

Janis Stone, PhD
Iowa State University

Brecca Farr, PhD
University of Alabama

James Wilson
South Dakota State University

Wendy Wintersteen, PhD
Iowa State University

by Van Meter (1971). He looked at adults' responses to and the educational value assessments of displays at a state fair. Based upon the adult learners' evaluations of displays and professional educators' analysis of the displays, Van Meter said it is most important that a display be easily understood and direct. Additional recommendations included distributing educational publications, having someone available to answer questions, encouraging the participant to learn more about the subject, and using the display during events which are meant to encourage or be conducive to learning (Van Meter, 1971).

Coffman and Watkins (1991) used a multidisciplinary approach and user feedback in developing a tabletop display on protective clothing for handling pesticides. They recognized the difficulty in creating materials that interest the audience to convey the needed information. Coffman and Watkins (1991) used Obahayujie and Hillison (1988) as justification for creating a portable display.

Fleming (1987, p. 236) suggested that "without attention there can be no learning" and that exhibit designers can influence attention and therefore learning. Fleming says this is because attention is selective, drawn to the novel, and affected by previous learning. Fleming (1987) also provided some foundation for designing effective displays. He stated that displays that communicate "grow out of prior analyses of learner characteristics, tasks, and learning situations" (p. 233).

In consideration of the need to learn more about key factors in small-scale educational exhibits for adult learners, the objectives of this study were to determine (1) features of the exhibit that attracted attention; (2) whether the nozzle-tip changing activity was important as a feature of the glove exhibit; and (3) whether exhibit participants would recall information two months later.

METHODS

Exhibit Design

An exhibit entitled "Pesticide Safety: If the Glove Fits, Wear It!" was designed in two versions, as previously mentioned. The

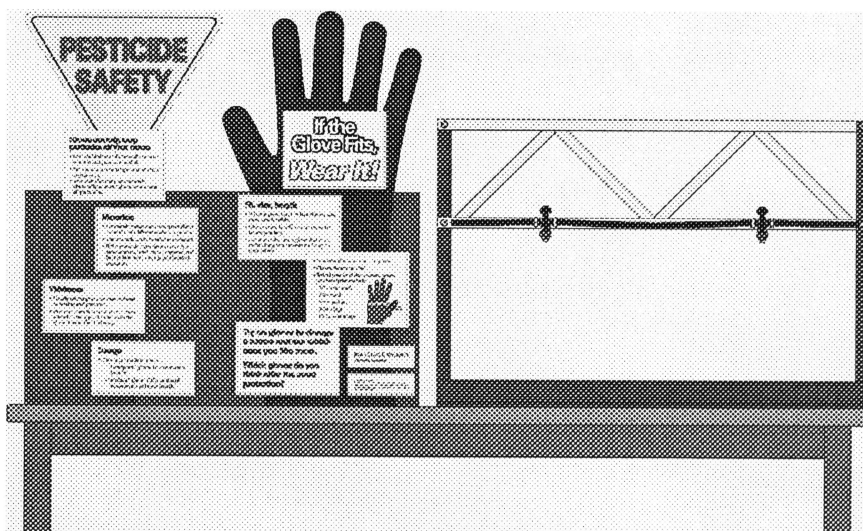


Figure 1.

static version had two stacks of panels with printed information mounted together against a large blue glove and a large triangular “caution” sign that said “Pesticide Safety” (see Figure 1). These panels explained measuring hands, glove characteristics, and their selection. The active version of the exhibit included the panels described in the static version and added a mock spray-boom with two quick-release spray nozzles mounted at a convenient height on top of the table. Both versions of this exhibit could be easily folded and packed for transporting.

On the days of the exhibit, the static version was used half of the time and the active version was used the other half of the time. Staff were present with both versions to measure hands and record glove size and gather responses to a short questionnaire. When the active version was used, staff encouraged exhibit visitors to try on gloves after their hands were measured to compare glove performance as they changed a nozzle tip. With the static version, this opportunity was not available; however, gloves were on display and could be tried on if anyone took the initiative. Neoprene, nitrile, and barrier laminate gloves were available in both displays in a range of sizes.

Event Day Survey

A one-page questionnaire provided a modified informed consent letter as well as questions

about current glove usage, preferred means of learning about glove safety, glove size, and demographic information and requested their name and address to use for a follow-up survey. This questionnaire was completed by each participant who visited the exhibit. Each participant was given a free fact sheet, titled “If the Glove Fits, Wear It.” Other fact sheets about chemical-resistant equipment and its care were made available.

Follow-Up Survey

A separate follow-up questionnaire was developed and mailed to all participants eight weeks after the exhibit events. The purpose of the follow-up survey was to determine the participants’ perceptions of the glove-safety exhibit and to assess their learning. The questionnaire asked about features of the exhibit that had attracted their attention and helped them learn the most about gloves. It also asked whether they agreed or disagreed with statements about glove use using a five-point scale (5, strongly agree and 1, strongly disagree). Subjects were asked if they had read the educational fact sheets provided.

A second copy of the follow-up questionnaire was sent to nonrespondents six weeks later. Data were analyzed using descriptive statistics and (2 of independence with SPSS software on a desktop computer. The level of significance was $P < 0.05$; however, in one instance, $P < 0.07$ was reported. Approval of the Human Subjects Committees at both universities was obtained before data collection began.

Statistical Analysis

Data from the events in the two states were pooled after it was determined that the age distributions were similar. Responses to survey questions were studied by calculating means and standard deviations and through percentage analysis. SPSS was used to calculate (2 with $P < 0.01$

used as the criteria for significance of relationship. Not all results are included in this report.

RESULTS AND DISCUSSION

In Iowa, the tabletop exhibit attracted 375 participants at the Agri-Business Expo. In South Dakota, 195 private and commercial pesticide applicators participated in the exhibit activity at two farm shows and a crop conference. Although data were collected onsite at the time of the exhibit, the results reported here are from the follow-up survey mailed to participants eight weeks following the events.

Response rate to the follow-up survey was 36% for the active group and 38% for the static group in Iowa, and 57% for the active group and 53% for the static group in South Dakota. The age distribution of respondents is shown in Figure 2.

When asked, "What attracted your attention at the glove exhibit?", respondents checked one or more of eight exhibit features, such as "the big blue glove," "educational publications available," and "information on background posters." "Talking to staff" was most frequently selected as the most important part of the exhibit that attracted their attention; "Getting hands measured" and "trying on gloves" were selected next (see Table 1). Although the activities of trying on gloves and nozzle changing were only available to the active

group at the Expo and farm shows, the responses of some of the static group members to the follow-up survey suggested they had also participated in these activities. This result may be due to the limitation of recall or it may be that these individuals have had experiences of trying on gloves and changing nozzle-tips. Although we expected a significant difference between the active and static groups responses to these survey items, there was not.

The question "What part of the exhibit helped you learn most about chemical-resistant gloves?" elicited similar responses. The most frequent response was "talking to exhibit staff" (45.6% active, 38.7% static). The next most frequent responses were "changing nozzle tips" and "trying on gloves" for the active group but not for the static group. A significant difference was found between groups on these features, as shown in Table 2.

Again, some of the static group members responded as if they had tried on gloves and changed nozzle tips when they had not.

Although background posters and educational publications were mentioned by 17% or less in both groups as being most important, the data showed that the fact sheets were taken home and passed along to someone else to read. When asked, "Did you read the fact sheets?," 80% of the

active and static groups responded, "yes." When asked if someone else also read their fact sheets, 32.5% in each group said "yes." This multiplier effect of learning when fact sheets are shared in families and among friends is encouraging.

To determine how effective the display was in delivering the educational content, the respondents were given three choices. No significant differences were found between the two groups for any of the

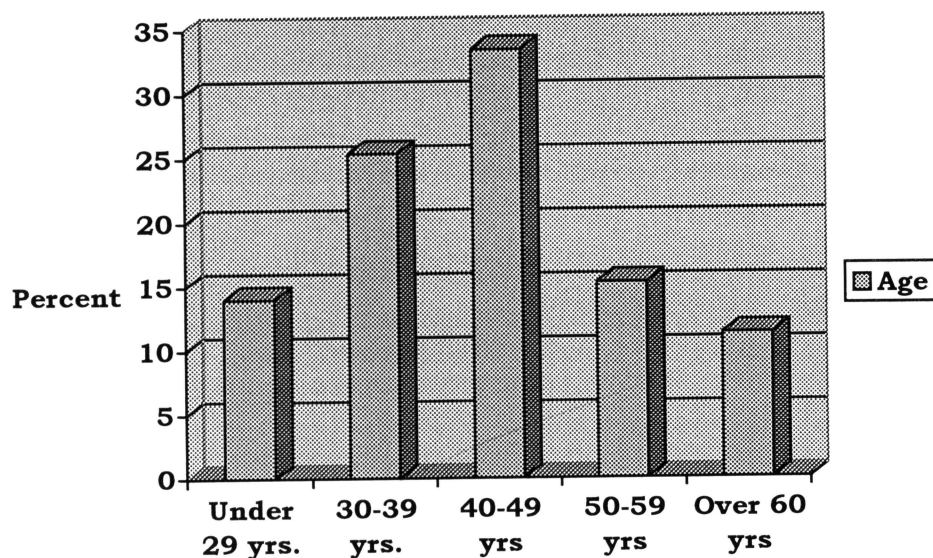


Figure 2. Age Distribution of Participants

three statements.

Table 3 shows that similar numbers from each group agreed with trying on gloves (94.8% active, 90% static). The groups agreed about the variation of the glove based on pesticide formulation (64.4% active, 68.5% static). The groups had less agreement concerning how chemically resistant gloves protect with 25.0% agreeing in the active group and 36.4% agreeing in the static group. It is disturbing to find that over 25% of both groups thought that chemically resistant gloves of various types protect equally as well. It is also problematic that such a small percentage disagree with the statement that suitable gloves vary by pesticide formulation. These responses indicate that there is more educational work to be done. The appropriate chemical-resistant gloves do vary with the pesticide being used. All types of gloves do not protect equally.

Participants were asked how they preferred to learn about protective gloves. Responses were similar for the active and static groups except on the use of exhibits for learning (see Table 4). Sixty-nine percent of the active group preferred the use of exhibits such as this one for learning about gloves compared to 41.1% in the static group. This significant difference between the groups' opinions may have been related to their investment of time at the display. Those in the active group were involved at the exhibit for a slightly longer time as they changed the nozzle tips. The complexity of the

Table 1. Exhibit Features Attracting Participants' Attention

EXHIBIT FEATURES	ACTIVE (<i>n</i> = 136)		STATIC (<i>n</i> = 111) ^a	
	YES (%)	NO (%)	YES (%)	NO (%)
Talking to exhibit staff	68.4	31.6	70.3	29.7
Trying on gloves	41.9	58.1	38.2	61.8
Getting hand measured	23.5	76.5	46.8	53.2
Big blue glove	17.6	82.4	26.1	73.9
Changing nozzle tips	16.9	83.1	12.6	87.4
Background posters	12.5	87.5	10.8	89.2
Educational leaflets	14.0	86.0	15.3	84.7
Other	8.8	91.2	1.8	98.2

^a Changing nozzle tips was not a part of the static exhibit.

exhibit was increased by the nozzle-tip activity and this may help explain the active group's preference for learning from exhibits, supporting Fleming's (1987) views. Numbers responding yes or no to applicator training classes were similar between the two groups. The majority of respondents in both groups (80–89%) did not use pesticide labels or protective equipment catalogs to learn about gloves.

All types of gloves do not protect equally.

Table 2. Participants' Reports of Exhibit Features That Helped Them Learn

EXHIBIT FEATURES	ACTIVE (<i>n</i> = 136)		STATIC (<i>n</i> = 111)	
	YES (%)	NO (%)	YES (%)	NO (%)
Talking to exhibit staff	45.6	54.4	38.7	61.3
Changing nozzle tips ^a	23.5	76.5	5.4	94.6
Trying on gloves ^b	21.3	78.7	9.9	90.1
Educational leaflets	17.6	82.4	14.4	85.6
Getting hand measured	6.7	93.3	10.8	89.2
Background posters	10.3	89.7	12.6	87.4
Big blue glove	1.5	98.5	1.8	98.2
Other	3.7	96.3	3.6	96.4

^a Significant at 0.000; ^b Significant at 0.015.

Table 3. Participants' Agreement About Using Gloves ^a

GLOVE STATEMENTS	STRONGLY AGREE				UNCERTAIN				STRONGLY DISAGREE	
	5		4		3		2		1	
	ACTIVE %	STATIC %	ACTIVE %	STATIC %	ACTIVE %	STATIC %	ACTIVE %	STATIC %	ACTIVE %	STATIC %
Trying on gloves helps to find a better fit	61.2	55.5	33.6	34.5	3.7	9.1	0.7	0.9	0.7	0.0
Suitable gloves vary by pesticide formulation	25.8	36.1	38.6	32.4	28.8	25.9	5.3	2.8	1.5	2.8
Chemical resistant gloves protect equally	13.6	17.3	11.4	19.1	28.8	25.5	20.5	21.8	25.8	16.4

^aActive *n* = 134; static *n* = 110.

CONCLUSIONS AND IMPLICATIONS

This research confirmed that educators need to consider all components of a learning setting: the learner, the teacher, the content, the context, and the environment, as previously noted by Heimlich and Norland in 1994. In the informal environment of a large Expo or farm show, in which glove content information is delivered in the context of both visual and hands-on stimuli, this study showed that the extra nozzle-changing activity was less important than the interaction with Extension educators. Interacting with educators and measuring hands were key factors in learning for the participants in both groups.

The "If the Glove Fits, Wear It" tabletop exhibit combined the aspects of the preferred delivery methods, as found by Obahayujie and Hillison (1988) and Van Meter's (1971) recommendations. Extension educators at the display provided individual contact. The nozzle-tip changing activity drew on participants' life experiences. The assumption that the blue glove would attract attention proved true, but few people recalled it as the "most important" attracting feature.

The features of the display that encouraged action and interaction on the part of the participant, such as

"talking to staff," seem important to the adult learning process. However, those parts of the display that were only associated with the active groups, "changing nozzle tips" and "trying on gloves," may have played a greater role in helping participants retain knowledge. This is substantiated by the significant difference between the groups as to what features of the exhibit helped them learn the most. Furthermore, this may explain why a greater number of the active group strongly disagreed with the statement, "Chemical-resistant gloves protect equally."

This study corroborates the recommendations of previous studies in trying to tie the content of the display with stimulating visual presentation and effective educational design, while keeping in mind the audience and other considerations, such as portability. A limitation of this study was that learning from the events attended could not be separated from learning that had occurred elsewhere. All learning of the participants may have been tapped in the responses to the follow-up

Table 4. Most Preferred Methods of Learning About Gloves

METHODS OF LEARNING	ACTIVE (n = 136)		STATIC (n = 112)	
	YES (%)	NO(%)	YES (%)	NO(%)
Exhibits similar to this one	69.1	30.9	41.1	58.9
Applicator training classes	40.4	59.6	50.9	49.1
Pesticide labels	11.0	89.0	18.8	81.3
Protective equipment catalogs	16.2	83.8	19.6	80.4

questionnaire. Clearly, static group members responded as if they had tried on gloves, when in fact they had not for this specific exhibit activity. It must be acknowledged that a truly static exhibit probably would not have had staff present. This study's most important finding is that staff support is necessary for successful adult learning at exhibits.

Interacting with educators and measuring hands were key factors in learning.

The If the Glove Fits, Wear It! exhibit experience and survey findings lead to the following suggestions that might be useful to educators:

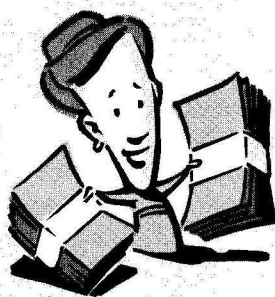
- * Keep the intended audience in mind and make the exhibit easy to use and transport.
- * Create colorful, attractive exhibits, as they are remembered. Such exhibits contribute to adult learning whether or not they involve active participation.
- * Distribute print resources at exhibits, as they

are read by many participants after visiting the exhibit. Printed resources from exhibits are often passed on to other learners.

- * Use exhibits for increasing awareness rather than for creating an understanding of fundamental concepts. For example, Table 4 shows much more uncertainty for items that related to toxicity and formulation.
- * Have enthusiastic, helpful staff working at an exhibit, as this maximizes learning.

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